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LEHRSTUHL FÜR INFORMATIK 2
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Advanced Model Checking
Summer term 2012

– Series 7 –

Hand in on June 13 before the exercise class.

Exercise 1 (3 points)

For the given function:

$$F(x_0, \ldots, x_{n-1}, a_0, \ldots, a_{k-1}) = x_{|a|}$$

where $n = 2^k$, $\forall i \in 0 \ldots n-1 \ : \ x_i = 0 \vee x_i = 1$, $\forall j \in 0 \ldots k-1 \ : \ a_j = 0 \vee a_j = 1$ and $|a| = \sum_{j=0}^{k-1} a_j 2^j$, provide two ROBDDs, considering the following two variable orderings:

$$a_0, \ldots, a_{k-1}, x_0, \ldots, x_{n-1}$$

and

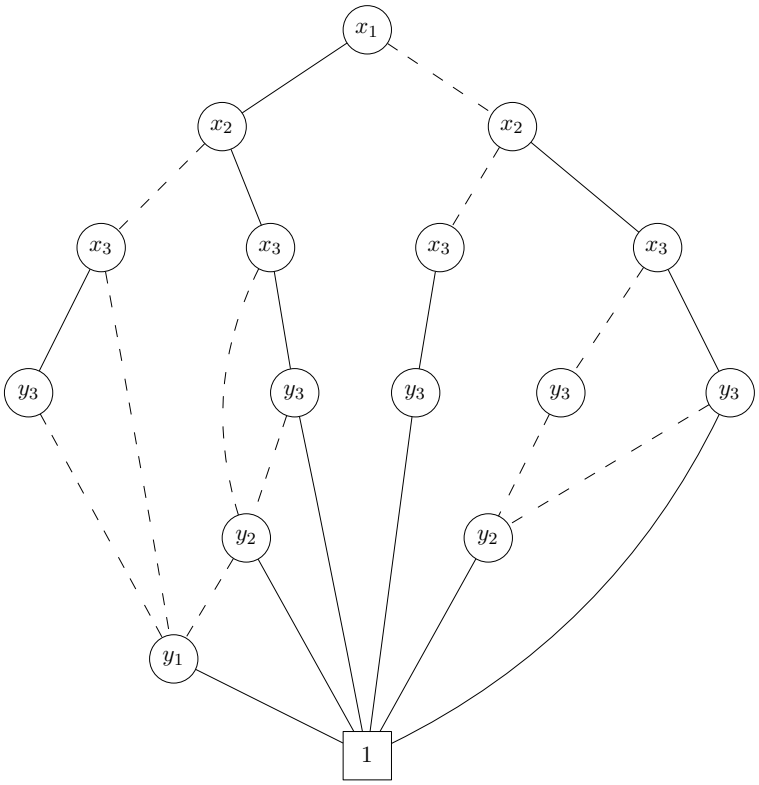
$$a_0, x_0, \ldots, a_{k-1}, x_{k-1}, x_k, \ldots, x_{n-1}$$

with $k = 3$.

Exercise 2 (2 points)

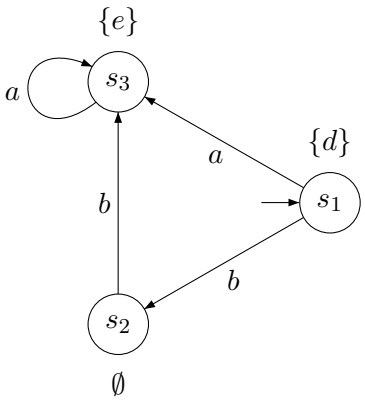
Given an ROBDD as follows, determine the boolean function $f(x_1, x_2, x_3, y_1, y_2, y_3)$ it represents.

(Hint: first to find a better variable ordering)



Exercise 3 (2 points)

Given a transition system TS with actions as follows:

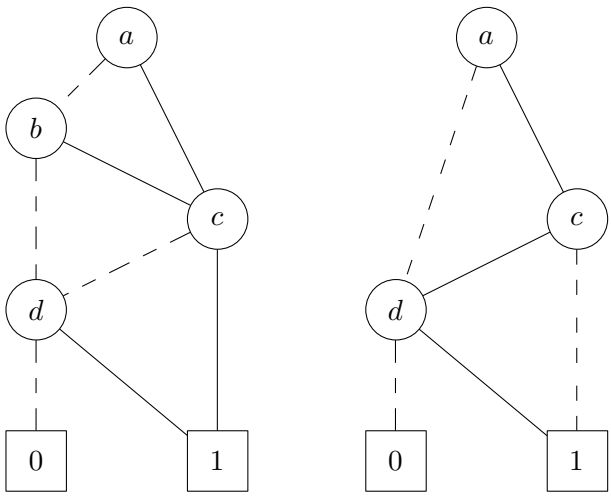


(a) Define how to obtain switching functions for this case and find a switching function for the above TS;

(b) Encode the TS by a ROBDD.

Exercise 4 (3 points)

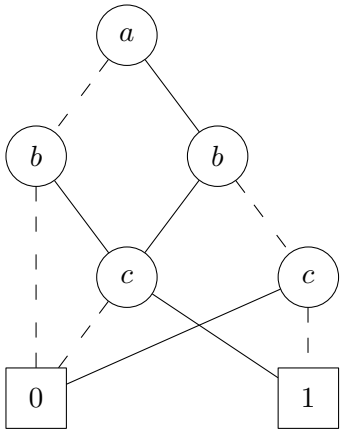
a) Compute $F \vee G$ for the following ROBDDs:



F G

Provide the intermediate steps.

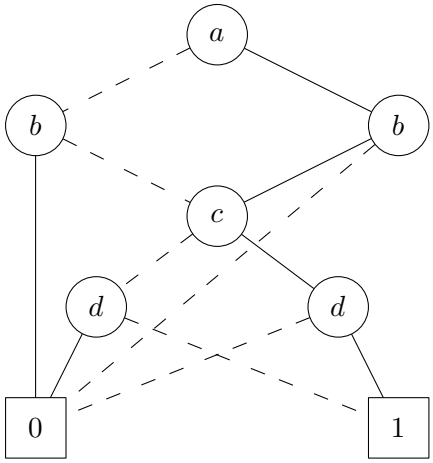
b) Compute $H|_{b=1}$, given the ROBDD below:



H

Provide the intermediate steps.

c) Compute $\exists a.(\exists d.f(a,b,c,d))$ in the form of ROBDD for the f function defined by the ROBDD below:



Provide intermediate steps.